

U. S. DEPARTMENT OF COMMERCE

BUILDING
MATERIALS
AND
STRUCTURES

REPORT BMS87

A Method for Developing
Specifications for Building
Construction

Report of
Subcommittee on Specifications of
the Central Housing Committee on
Research, Design, and Construction

NATIONAL
BUREAU OF STANDARDS

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Report of Subcommittee on Specifications of the Central Housing Committee
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The National Bureau of Standards is a fact-finding organization; it does not "approve" any particular material or method of construction. The technical findings in this series of reports are to be construed accordingly

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Foreword

This report has been prepared by a committee of representatives from Federal agencies as a guide for those who write or approve specifications for building construction. The object has been to promote efficient preparation and proper arrangement at a minimum outlay of time and labor. The report should aid in bringing about greater uniformity in specification work.

It is believed that economy and efficiency in building construction, ease of inspection, and elimination of controversies through better understanding will result from the reduction of specifications to their technical essence and minimum form.

LYMAN J. BRIGGS, *Director.*

A Method for Developing Specifications for Building Construction

Report of Subcommittee on Specifications of the Central Housing Committee on Research, Design, and Construction

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ABSTRACT

To meet the demand for short and uniform specifications for Government building construction, and in an attempt to reduce the time and labor now consumed in their preparation, a representative committee of Federal agencies has made a study of current specification-writing routine. In its report, this Committee advocates a directive method which, under proper supervision, should condense specifications, bring about important economies, and increase efficiency.

Fundamental principles that have proved of value

over a period of years have been retained and are coordinated in a basic specification which promotes uniformity and permits choice of those materials and methods of construction best suited to the specific project in hand.

Application of the method is made clear by three examples: a model basic specification illustrating the procedure outlined, a typical contemporary specification, and the typical specification rewritten in accordance with the method advocated.

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INTRODUCTION

Specifications provide primary buying information for a specific project to buyers in a specific market at a specific time. They are therefore of interest to all who design structures,

purchase materials and equipment, or are concerned with loans or the allocation of funds in connection therewith.

During the past few years there has grown

up throughout the building industry an insistent demand for shorter and more uniform specifications applicable to all types of Federal construction. More recently this demand has been accentuated by the contingencies of war, requiring that waste in Federal procedures be eliminated and that Government offices function at maximum speed without sacrificing accuracy.

In order to work out an acceptable method, representatives of a number of Government agencies organized as a Subcommittee of the Central Housing Committee on Research, Design, and Construction to study preparation routine. After careful comparison of contemporary specifications issued by more than a dozen Government sources, this Subcommittee developed a means of accomplishing brevity and uniformity in format and phraseology.

The method is a connected and logical compilation of essential specification matter which permits the user to exercise his own judgment in the selection of materials and workmanship. It is not a rigid standard of practice that must be followed in detail, but its systematic use should bring about increased speed and efficiency in the preparation of specifications and in the construction of projects.

DEVELOPMENT OF BASIC SPECIFICATION FORMS

In its study the Subcommittee found that proper design of specifications results from the judicious selection, orderly arrangement, and efficient preparation of the subject matter and that this can best be achieved through the systematic use of carefully prepared basic forms. The style adopted is taken from that developed by Horace W. Peaslee, Washington architect, the distinctive features of which are (1) *a mandatory provision concentrated in a single governing clause* and (2) *the body of the specification in abbreviated outline form—with sentence structure eliminated.*

The selection of items is governed by the project under consideration and accordingly

is not subject to standardization. A basic form of specification should be as broad as possible in its scope, should cover the maximum number of up-to-date products and methods, and should include only information that can be utilized.

The order of arrangement should follow substantially the order in which the specified work and its interlocking operations proceed. Attention to typography and to legibility (rather than space economy), to paragraphing and to captions will make for easier reading. Repetitions should be avoided. Concise factual statements and the use of simple words, charts, and symbols will aid in understanding the text. Indexing, cross-referencing, and annotating will facilitate comparison.

WRITING SPECIFICATIONS, USING MODEL BASIC FORM

To illustrate the practical application of its recommendations, the Subcommittee developed the masonry section of a model basic form, which is presented as part I.

The system of numbering and the arrangement of text are for convenience of reference and selection of specific clauses. Needed information can be readily located. Changes can be made in this basic form to adapt it to an agency's established policy by choosing applicable items and by adding desired technical detail. Instructions and notes should not appear in the finished document.

In compiling his data the specification writer would:

- (a) Indicate titles and arrangement of sections and subsections;
- (b) Designate by number the clauses to be copied;
- (c) Supply additional matter pertinent to the specific project.

To further illustrate, the Subcommittee selected at random a typical masonry specification (part II) from the files of a governmental agency and, using the model basic form (part I), rewrote it to produce the streamlined specification given in part III.

PART I. MODEL BASIC SPECIFICATIONS, MASONRY

- 2-1. **SCOPE.**—Mention herein or indication on the drawings of articles, materials, operations, or methods requires that the contractor provide each item mentioned or indicated, of quality, or subject to qualifications, noted; perform according to conditions stated, each operation prescribed; and provide therefor all necessary labor, equipment, and incidentals.
- .1 See "General Conditions," "Special Conditions," and "Bid Form."
- 2-2. **COMMON BRICK.**—Fed. Spec. SS-B-656; $2\frac{1}{4}'' \times 3\frac{3}{4}'' \times 8''$; Class [specify class, as in .1 and .4]
- .1 H, for brick [specify locations, as in .2 and .3]
- .2 in contact with earth;
- .3 exposed to weather;
- .4 M, [specify locations, as in .5]
- .5 elsewhere;
- .6 using only solid brick at sides and heads of openings.
- 2-3. **SAND-LIME BRICK.**—Fed. Spec. SS-B-681; $2\frac{1}{4}'' \times 3\frac{3}{4}'' \times 8''$; Class [specify class, as in .1 and .4]
- .1 H or M, [specify locations, as in .2 and .3]
- .2 for back-up work;
- .3 for concealed exterior work;
- .4 H, [specify locations, as in .5]
- .5 for exposed interior work;
- .6 for use, at contractor's option, in lieu of Class M common brick.
- 2-4. **CONCRETE BRICK.**—Fed. Spec. SS-B-663; $2\frac{1}{4}'' \times 3\frac{3}{4}'' \times 8''$; Class H or M; [specify locations, as in .1 to .3]
- .1 for back-up work;
- .2 for concealed interior work;
- .3 for exposed interior work;
- .4 for use, at contractor's option, in lieu of [specify what, as in .5 and .6]
- 2-4.5 Class M common brick.
- .6 sand-lime brick.
- .7 May be recessed on one bed not to exceed 10% total brick volume provided recess not within 1" of any edge and provided brick laid with recessed side down.
- 2-5. **EXPOSED BRICK.**—[Specify kind, as in .1]
- .1 common;
- .2 selected for color and shape; show surfaces similar in color and texture, free from distortion, warpage, cracks, and other imperfections and with good corners and edges.
- .3 *Exterior:* [specify color range and texture or, if selected common brick is not required, specify maximum allowable absorption of water and either specify color range, texture, and trade name of type ("enameled," "glaze," etc.) or specify trade name of type and use .4]
- .4 to match sample on display in office of [specify where sample may be seen]
- NOTE.**—If belts or areas of different shades or textures are required, use .5 to .12
- .5 Brick of [specify shade, as in .6 and .7]
- .6 lighter
- .7 darker
- .8 shade and [specify texture, as in .9 and .10]
- .9 rough
- .10 smooth
- .11 texture for [specify locations or use .12]
- .12 areas so indicated.
- .13 *Interior, except where painted:* [specify color range and texture, or, if selected common brick is not required, either specify color range,

- 2-5.13 texture, and trade name of type ("enameled," "glazed," etc.) or specify trade name of type and use .14]
- .14 to match the sample on display in office of [specify where sample may be seen]
- 2-6. MOLDED OR GROUND BRICK.—Color and texture to match adjacent brick; accurate size to exact line for [specify what, as in .1 to .6]
- .1 sloping sills,
.2 water table,
.3 arches,
.4 pattern work,
.5 ornamental work,
.6 special courses.
- 2-7. BRICK FOR FIREPLACE LINING, FACING, AND FRONT HEARTH.—[specify color, texture, and trade name of type or use .1 to .3 as the case may be]
- .1 similar to [specify what, as in .2 and .3]
.2 exposed exterior brick.
.3 exposed interior brick.
- 2-8. FIRE BRICK.—Fed. Spec. HH-B-671b; [specify grade, as in .1 and .4]
- .1 Back-up Duty Grade, for [specify locations, as in .2 and .3]
.2 fireplace linings
.3 and under fires;
.4 Moderate Heat Duty Grade, for [specify locations, as in .5 and .6]
.5 chimney linings
.6 incinerator combustion chambers.
- 2-9. FLUE LININGS AND THIMBLES.—Hard-burned fire clay; free from fractures, large cracks, blisters, and warping; standard sizes; sound. Thimbles for each flue where directed.
- 2-10. TILE COPINGS.—Standard salt-glazed, with socket joints; sound; free from fractures, cracks, blisters, and warping; of proper width to overlap wall;
- .1 starting pieces,
.2 corner pieces,
.3 special shapes,
.4 closed end pieces,
.5 as required.
- 2-11. BRICK FOR PAVING.—[Specify type, as in .1 or .2 to .7]
- .1 common; selected for color; solid; free from chips and other
.2 Fed. Spec. SS-B-671a; [specify type, as in .3 or .4 to .7]
.3 repressed lug type.
.4 vertical fiber lug type; [specify size, as in .5 to .7]
.5 $2\frac{1}{2}'' \times 4'' \times 8\frac{1}{2}''$.
.6 $3'' \times 4'' \times 8\frac{1}{2}''$.
.7 $3\frac{1}{2}'' \times 4'' \times 8\frac{1}{2}''$.
- 2-12. FLASHING BLOCKS.—Hard-burned terra cotta with diagonal groove $1\frac{1}{2}''$ deep, measured horizontally, to receive flashing; of size to replace and course with two courses of brick; special shapes to provide continuous groove.
- .1 at internal corners.
.2 at external corners.
.3 at internal and external corners.
- 2-13. HOLLOW CLAY TILE.—[Specify types, as in .1 and .8]
- .1 *Load-Bearing*: Fed. Spec. SS-T-341; Grade M; for [specify locations, as in .2 to .5]
.2 exterior walls,
.3 load-bearing partitions,
.4 party walls,
.5 silo construction;
.6 closures, fitters, and special shapes as required;
.7 designation as "load-bearing" and name, initials, or trade-mark of manufacturer legibly indented on exterior of each tile.
.8 *Non-Load-Bearing*: Fed. Spec. SS-T-351; Grade S; for [specify locations, as in .9]
.9 non-load-bearing partitions;
.10 closures, fitters, and special shapes as required;
.11 name, initials, or trade-mark of manufacturer legibly indented on exterior of each tile.
.12 *Tile for Silo Construction*: load-bearing; $6''$ thick; radial; double shell both sides with trough at top to receive steel reinforcing rods; correct

radius; especially manufactured for this purpose with inner and outer faces glazed.

2-14. CONCRETE MASONRY UNITS.—Fed. Spec. SS-C-621; weight a; [specify type, as in .1 and .3]

- .1 Type I; [use .2 if optional material and, if not, specify locations, as in 2-13.2 to .5]
- .2 in lieu of load-bearing hollow clay tile at contractor's option;
- .3 Type II; [use .4 if optional material and, if not, specify locations, as in 2-13.9]
- .4 in lieu of non-load-bearing clay tile at contractor's option;
- .5 standard sizes and shapes with closures, fitters, and special shapes as required;
- .6 free from deleterious matter that will [use .7 or .8 or both, as the case may be]
- .7 stain plaster;
- .8 corrode metal;
- .9 adequately cured by air, water, or steam before shipment;
- .10 test reports showing compliance with moisture content requirements unless cured in high-pressure steam;
- .11 smooth surfaces of uniform texture where exposed or painted.

.12 *Lead Insulated Units:* unpierced sheet of 4-lb lead through center and extending at least 1½" on all four sides and with cemented-on, not burned or soldered, anchors for holding masonry unit segments; masonry unit segments on either side of sheet lead removable in part or in whole.

2-15. GYPSUM PARTITION TILE.—Fed. Spec. SS-T-316; [use .1 if optional material and, if not, specify locations]

- .1 in lieu of non-load-bearing hollow clay tile at contractor's option; [specify exceptions, if any, where gypsum tile should *not* be used, as in .2 to .11]
- .2 except in
- .3 basements,
- .4 first course in partitions,

- 2-15.5 partitions enclosing toilet rooms,
- .6 partitions around bathtubs,
- .7 shower-room partitions,
- .8 parts of partitions receiving [specify what, as in .9 to .11]
- .9 cement plaster,
- .10 lime plaster,
- .11 cement base for reception of other materials.

2-16. STRUCTURAL FACING UNITS.—[Specify conformity to standards, as in .1 to .10, or use .9 to .28]

- .1 First Quality in accordance with Standard Grading Rules of Brick and Tile Institute; [specify finish, as in .2 to .5]
- .2 ceramic glazed units of [specify color, as in .6 to .8]
- .3 salt-glazed units of [specify color, as in .6 to .8]
- .4 clay coated units of [specify color, as in .6 to .8]
- .5 unglazed units of [specify color, as in .6 to .8]
- .6 uniform
- .7 variable
- .8 color [specify color by manufacturer's name, giving trade name or catalog number of tile colors and locations of each different color required, or use .17]
- .9 highest structural and mechanical quality; free from chips, crazes, blisters, crawling, and other imperfections; of fire clay formed into cored units; coring not less than 25% nor more than 45% of gross sectional area; surfaces to receive setting mortar or plaster—scored; crushing strength for load-bearing units not less than 2,500 lb per sq in. of gross bearing area; dimensions as follows:

	Dimensions								
	Height		Length				Depth		
	5 in.	8 in.	8 in.	12 in.	16¼ in.	1¾ in.	3¾ in.	5¾ in.	8 in.
Maximum variations.....in.	3/32	1/8	1/8	3/16	1/4	3/16	3/16	3/16	1/4
Face area.....sq. in.		40	40	60	60		130	130	130
Maximum face plane or edge distortion.....in.		1/16	1/16	3/16	3/16		1/4	1/4	1/4

- 2-16.10 *Ceramic Glazed Units* for [specify locations if not shown on drawings]
- .11 thoroughly coated; uniform glaze made vitreous and permanent by burning; meeting following tests [use .13 to .15 with or without .12 as the case may be]
- .12 when so directed by [specify whom]
- .13 *Resistance to Craziing (Autoclave Test)*: ASTM Standard Spec. C126-39T.
- .14 *Cause for Rejection*: evidence of crazing, spalling, peeling, cracking, or stains. Slight discoloration in depressions of matt finish permitted.
- .15 *Acid Resistance*: ASTM Standard Spec. C126-39T. Cause for rejection—any alteration of color or luster.
- .16 *Unit Colors*: [specify colors in detail or use .17]
- .17 corresponding to sample on display in office of [specify location of sample]
- .18 finish [specify finish, as in .19 to .21]
- .19 glossy.
- .20 satin.
- .21 matt.
- .22 *Salt-Glazed Units* for [specify locations if not shown on drawings]
- .23 smooth, lustrous, light-reflecting glaze resistive to crayon and pencil marks and produced by introduction of salt into fire during burning process; unit colors [specify colors or use .17]
- .24 *Clay Coated Units* for [specify locations if not shown on drawings]
- .25 unit colors [specify colors, or use .17]
- .26 *Unglazed Units* for [specify locations if not shown on drawings]
- .27 finish similar to highest grade of face brick without showing extreme discolorations when exposed to methylene blue test; unit colors [specify colors or use .17]
- .28 Two units of different thicknesses bonded together for partitions more than 4" thick; units of same thickness bonded every course with corrugated or crimped ties not over 8" o. c. or with continuous wire mesh ties;
- .29 Special shapes as required for [specify what, as in .30 to .36]
- .30 sills,
- .31 coves,
- .32 caps,
- .33 molds,
- .34 jambs,
- .35 head returns,
- .36 starters;
- .37 rounded external corners except where otherwise shown; rounded internal corners not required.
- .38 Bases with square bottom edge in connection with
- .39 cement
- .40 resilient
- .41 floor finishes.
- .42 Bases with cove bottom edge in connection with
- .43 tile.
- .44 terrazzo.
- .45 Face sizes not less than [specify limits, as in .46]
- .46 5" x 8" nor more than 6" x 12".
- .47 Thickness
- .48 $1\frac{3}{4}"$,
- .49 $3\frac{7}{8}"$,
- .50 $5\frac{7}{8}"$,
- .51 8",
- .52 or as otherwise required.
- .53 Mortar joints
- .54 $\frac{1}{4}"$ thick,
- .55 $\frac{3}{8}"$ thick,
- .56 natural.
- .57 colored.
- .58 white
- 2-17. GLASS BUILDING UNITS.
- NOTE.—If glass building units are included in Masonry, select applicable clauses for the material from section ----- of the Basic Specifications and incorporate at this point in finished specifications.
- 2-18. SLATE FOR DAMP COURSES.—Fed. Spec. SS-S-451, Grade A; sawed edges; split faces; full width of wall; not less than $\frac{3}{16}"$ uniform thickness.
- 2-19. SLATE FOR WINDOW SILLS.—Fed. Spec. SS-S-451, Grade A; exposed surfaces planed; other faces split;

other edges sawed; not less than 1½" uniform thickness; one piece unless otherwise shown.

2-20. PRE-CAST CONCRETE CHIMNEY CAPS.—Fed. Spec. SS-S-721, Type I; reinforcements Fed. Spec. QQ-B-71a, Type B, Grade 1, 2, or 3; beds and joints at right angles to face; arrises sharp and true; cured and seasoned before delivery.

2-21. STONE FOR TRIM.

NOTE.—If amount of stone justifies, omit from Masonry and include in separate section in finished specifications.

- . 1 Standard Buff ----- limestone with smooth machine finish show surfaces free from tool marks;
- . 2 light-gray granite of fine or medium grain with 4 cut finish on show surfaces;
- . 3 ----- grade buff-brown ----- sandstone with smooth finish show surfaces free from clay pits;
- . 4 beds and joints at right angles to face; arrises sharp and true;
- . 5 lugs, seats, washes, and drips on window sills;
- . 6 drips at least ¾" wide and ⅝" deep.

2-22. PRE-CAST CONCRETE TRIM.—Fed. Spec. SS-S-721, Type I; reinforcements Fed. Spec. QQ-B-71a, Type B, Grade 1, 2, or 3; beds and joints at right angles to face; arrises sharp and true; cured and seasoned before delivery.

2-23. SHEET LEAD.—Fed. Spec. QQ-L-201.

2-24. MORTAR MATERIALS.

NOTE.—If mortars are included in finished masonry specifications, select applicable clauses for mortar materials from section ----- of the Basic Specifications and incorporate at this point in finished specifications.

2-25. THROUGH-WALL FLASHINGS.

NOTE.—For *metal* through-wall flashings, see section ----- of the Basic Specifications. For *other types*, see section ----- If through-wall flashings (except metal) are to be laid in trowelled-on mortar bed by the mason, select applicable clauses covering materials from section ----- of the Basic

Specifications and incorporate at this point in finished specifications.

2-26. ANCHORS AND TIES.—To secure masonry to backing or adjoining construction;

NOTE.—Use of critical materials should be restricted in accordance with Agency instructions.

- . 1 wire mesh—16 gage, ½" mesh, 3" wide;
- . 2 wire—not less than 11 gage, looped at each end.
- . 3 corrugated or crimped metal—⅞" wide, at least 22 gage;
- . 4 dovetail type for use in slots or inserts—at least 9 gage;
- . 5 bars—steel or wrought iron, 1½" wide by ⅛" thick with end lugs turned up at least 2";
- . 6 rods—steel or wrought iron, ¼" diameter with ends bent 2" or with 2" diameter rings, each end; [specify protective coating, as in .7 to .9] cement coated.
- . 7 bituminous coated.
- . 8 dip coated with lead-in-oil paint.
- . 10 hot-dip zinc coated.

2-27. MORTAR.

NOTE.—If mortar materials are included (see 2-24. above), select applicable clauses for proportions, mixing, etc., from section ----- of the Basic Specifications and incorporate at this point in finished specifications.

2-28. SAMPLES.—As follows to [specify whom]

NOTE.—Specify what samples are required, the number, size, etc., of each, as in .1 to .7 and when required.

- . 1 *Brick*: all shapes, sizes, and kinds in sufficient number to show full range of colors.

- . 2 *Brick Panel*: built where directed on site; 6' 0" long, 4' 0" high, and 4" thick; showing required shape, size, and type of brick, full range of colors, bond, and mortar joint.

- . 3 Panel numbers on drawings refer to sample panels on display at [specify where]

- 2-28. 4 which indicate general colors and textures required.
- . 5 *Flashing Block*: two
- . 6 *Hollow Clay Tile*: two each of all types and grades.
- . 7 *Concrete Masonry Units*: two each type.
- . 8 *Gypsum Partition Tile*: two
- . 9 *Structural Facing Units*: each type in sufficient number to show sizes, range of colors in fields, borders, etc.

NOTE.—Include slate, pre-cast concrete, stone, mortar materials, glass blocks, and other materials as required by specific project.

- 2-29. **BRICKWORK**.—Plumb; true to lines; courses level; reveals and corners, plumb and true; each course laid as through course with no vertical joint in any one course directly over vertical joint in course next below; each brick shoved into place, not laid, in full unfurrowed bed of mortar; all horizontal and vertical joints completely filled with mortar as, or when, laid;
- . 1 back joint against [specify what, as in .2 to .5]
- . 2 concrete,
- . 3 metal,
- . 4 hollow clay tile,
- . 5 concrete masonry units,
- . 6 slushed, grouted, or shoved full as course is laid;
- . 7 inside face of [specify what, as in .8]
- . 8 stone facings
- . 9 parged as facing units are laid, followed immediately by backing.
- . 10 spaces under and behind metal casings and stools—filled solid with mortar;
- . 11 jambs and heads of frames—filled solid with mortar;
- . 12 corbelled courses to project not over 1" beyond course next below;
- . 13 chases and reglets free from mortar or debris at completion.
- . 14 Walls laid in [specify bond, as in .15 to .18]

- 2-29. 15 common bond, i. e. running bond, whole stretchers overlapping each other by $\frac{1}{2}$ brick, with course of whole headers every 6th course.
- . 16 English bond, i. e. alternating courses of whole stretchers, overlapping each other by $\frac{1}{2}$ brick, and headers with whole headers every 3d course.
- . 17 Flemish bond, i. e. alternating headers and whole stretchers in each course so arranged as to appear in vertical lines in every other course, with whole headers every 3d course.
- . 18 running bond, i. e. whole stretchers overlapping by $\frac{1}{2}$ brick and tied together and to backing with wire, corrugated or crimped ties on alternating brick in every 3d course.
- . 19 Only hard, well-burned brick for first 6 courses exterior brickwork above and adjacent to or below grade line.
- . 20 Brick with greater than 12% absorption wetted 24 hours before laying except in freezing weather. No freshly wetted brick, or brick with film of water or frost, laid.
- . 21 *Face Work*: accurately spaced courses laid out with story rod; bond plumb, laid out and adjusted with no terminating brick at corner or opening less than $\frac{1}{2}$ brick size; vertical joints slightly thinner than horizontal; free from stains, smears, and dirt at completion;
- NOTE.—Use .22 for Flemish bond only.
- . 22 headers carefully centered to plumb lines.
- . 23 *Unfinished Work*: stepped back for joining new work; toothed only when approved by [specify whom]
- . 24 swept clean; loose mortar removed; thoroughly wetted from 12 to 24 hours before laying new work.
- . 25 *Joints in Face Work*: approximately $\frac{1}{2}$ " wide;
- . 26 natural color mortar;
- . 27 struck;
- . 28 concave;
- . 29 weathered;

- 2-29. 30 raked back $\frac{3}{8}$ ";
- . 31 flush and rodded;
- . 32 formed with suitable tools after mortar has taken initial set.
- . 33 *Other Joints:* flush in exposed work;
- . 34 raked back $\frac{3}{8}$ " where plastered
- . 35 or stuccoed.
- . 36 *Cavity Walls:* stretcher facing tied to backing with rod ties in horizontal joints, using one tie at least every 3 sq ft in general. Ties 12" apart horizontally above and below openings; 12" apart vertically within 8" of opening jambs; two horizontally and 18" vertically in piers between openings and between openings and wall ends. Weep holes and vents tested on completion of each wall, by running water into space back of facing to demonstrate free flow through vent holes, and drilled as necessary to un-plug.
- . 37 *Veneer:* stretcher facing anchored to backing with
- . 38 20d nails
- . 39 crimped metal or rod ties
- . 40 spaced not over 36" apart horizontally and bonded into horizontal joints every 5th course; weep holes drilled as necessary to un-plug at completion.
- . 41 *Interior facing* tied to masonry backing with one wire-mesh or corrugated-metal looped wire for each 2 sq ft, extending at least 4" into masonry backing and within $\frac{1}{2}$ " of outer face of facing.
- . 42 *Exterior facing* tied to concrete backing with a row of dovetailed anchor ties in every 4th course spaced 16" apart horizontally.
- NOTE.—Specify slots for dovetailed ties under section "Concrete Work."
- . 43 *Centering* for arches [specify centering required or use .42 as the case may be]
- . 44 will be provided as specified under "Carpentry."

- 2-30. **HOLLOW CLAY TILE WORK—CONCRETE MASONRY UNIT WORK—GYPSUM TILE WORK.**—Plumb to lines; in full bed of mortar; vertical joints breaking approximately at middle of tile in course next below; courses bonded at corners and intersections; cells horizontal except may be vertical at pipes or conduits; no cells left open in wall surfaces; brick fill-ins as required for [specify what, as in .1 to .4]
- .1 securing plumbing or other fixtures,
- .2 filling out corners,
- .3 gable slopes,
- .4 bearing for joists and beams.
- .5 *Exterior Wall Back-up:* without horizontal joints continuous through to face of wall; so as to provide positive water stop; inside face of back-up back of [specify what, as in .6 and .7]
- .6 facing brick
- .7 stone work
- .8 parged as facing units are laid.
- .9 *Wetting:* hollow clay tile with greater than 12% absorption, wetted 24 hours before laying except in freezing weather. No freshly wetted tile or tile with film of water or frost laid.
- .10 *Partitions:* 4" thick unless otherwise shown; bonded or anchored to any other adjacent masonry with wire mesh, corrugated metal, bar or rod ties in every other course extending
- .11 4" into concrete
- .12 8" into brickwork
- .13 12" into hollow masonry
- .14 and spaced
- .15 16" apart vertically for 4" thick partitions,
- .16 24" apart vertically for partitions thicker than 4".
- .17 Partitions to extend from floor to ceiling [specify locations, as in .18 to .21]
- .18 along corridors
- .19 around elevator shafts
- .20 around pipe shafts;

- 2-30.21 where lead insulated units are used;
 .22 elsewhere to suspended ceilings where
 same occur, unless otherwise shown;
 .23 joints at ceilings wedged and slushed
 full of mortar from both sides.
 .24 *Interior Channel Spaces of Col-
 umns:* filled in solid, using special
 shapes as required for this purpose.
 .25 *Reinforced Lintels:* of [specify,
 what, as in .26 and .27]
 .26 hollow clay tile;
 .27 concrete masonry units;
 .28 over all openings except where steel
 lintels occur; extended at least 8" on
 each side of opening; cells horizontal,
 filled with 1:2:4 mix concrete and re-
 inforced full lintel length with one
 $\frac{1}{2}$ " rod through each top and bottom
 cell of multiple-cell width tile and
 two rods in top cell and two in bottom
 cell of single-cell width tile.
 .29 *Lead Insulated Units:* all pro-
 jecting edges of lead sheets over-
 lapped with adjacent sheets in all
 joints and at all door frames, etc.;
 partitions underlaid with continuous
 4-lb sheet lead strip full width, con-
 tinuous under door frames and thresh-
 olds and with end joints lapped at
 least 2".
 .30 Partitions tested at completion
 with portable X-ray machine having
 capacity to emit a ray of penetrating
 value equal to X-ray machine to be
 permanently installed. Work cor-
 rected and retested which shows X-
 ray leakage or absorption less than
 absorption obtained through 4-lb
 sheet lead.
 .31 *Furring Units* tied to masonry
 backing with one wire-mesh, corru-
 gated-metal, or looped-wire tie for each
 2 sq¹ ft, extending at least 4" into
 masonry backing and to within $\frac{1}{2}$ " of
 outer face of furring unit.
- 2-31. STRUCTURAL FACING UNIT WORK.—
 Plumb to lines; in full bed of mortar;
 vertical joints breaking approximate-
 ly at middle of unit in course next
 below; courses bonded at corners and
 intersections; anchored to concrete
 and other masonry; joints uniform
 width, tooled slightly concave; chip-
 ped or spalled glaze not accepted.
- .1 Walls
 .2 and wainscots
 .3 built with full courses.
 .4 *Cutting units:* with power saw to
 straight, clean-cut joints; as required
 for built-in work.
- 2-32. GLASS BUILDING UNIT WORK.
 NOTE.—If glass building units are to be in-
 cluded in "Masonry," select applicable
 clauses for installation of same from section
 ----- of the Basic Specifications and
 incorporate at this point in finished speci-
 fications.
- 2-33. SLATE WINDOW SILLS.—Tamped to
 solid bearing on full bed of mortar
 entire length; to project at least $\frac{3}{4}$ "
 beyond exterior face of wall.
- 2-34. SLATE DAMP COURSES.—Tamped to
 solid bearing on full bed of mortar
 entire length; flush with wall face
 both sides; and joints butted snug
 NOTE.—Use .1 for two layers.
 .1 and staggered.
- 2-35. STONE TRIM.
 NOTE.—If stone for trim is included under
 "Masonry" (see 2-21.), select applicable
 clauses for installation of same from section
 ----- of the Basic Specifications and
 incorporate at this point in finished speci-
 fications.
- 2-36. FLUE LININGS.—Full height of chim-
 ney, starting 2' 0" below lowest
 smoke entrance, one section ahead of
 masonry; full mortar beds; space be-
 tween linings and brickwork slushed
 full of mortar as work progresses;
 joints close and struck flush on inside;
 thimbles neatly fitted with full mortar
 joints struck flush; flues free from
 surplus materials and debris.
- 2-37. THROUGH-WALL FLASHINGS.
 NOTE.—For clauses covering installation of
 metal through-wall flashings see section
 ----- of the Basic Specifications. If
 through-wall flashings (except metal) are to
 be laid in trowelled-on mortar bed by
 mason, and are included under this section

in the finished specifications (see 2-25.), use the following.

- 2-37.1 on solid bed of trowelled-on mortar entire length; end joints lapped at least 6" and made tight with plastic cement between layers, over top layer and under bottom layer; solid continuous trowelled-on bed of mortar on top for reception of masonry over.

NOTE.—Weep holes, if required, should be specified at this point.

- 2-38. PAVING-BRICK WORK.—Laid on edge with close joints in dry mixture of cement and sand; tamped solidly into place; grouted to fill all joints.

NOTE.—For clauses covering paving base, expansion joints in paving, etc., see sections ----- and ----- of the Basic Specifications.

- 2-39. FIRE-BRICK WORK.—Plumb; true to line; courses level; no vertical joint in any one course directly over vertical joint in course next below; joints not over $\frac{1}{8}$ " thick struck flush;
.1 tie to backing with metal ties not over 16" o. c. both ways.

- 2-40. RADIAL BRICK.

NOTE.—If radial brick is to be included in the "Masonry" section, select applicable clauses from section ----- of the Basic Specifications and incorporate at this point in finished specifications.

- 2-41. INCINERATORS.—Submit shop drawings.

2-42.

BUILT-IN ITEMS.—As work progresses; following items provided as specified under other sections:

- . 1 sheet metal,
- . 2 loose structural steel,
- . 3 metal chimney caps,
- . 4 anchors and ties,
- . 5 sleeves,
- . 6 thimbles,
- . 7 frames,
- . 8 inserts,
- . 9 wall plugs,
- . 10 blocking,
- . 11 grounds,
- . 12 furring.

2-43.

CUTTING AND PATCHING.—As required to accommodate work of others.

2-44.

PROTECTION.—Surfaces not being worked on—from frost; tops of walls at end of each day or when rain or snow is imminent—by covering with strong waterproof membrane well secured in place.

2-45.

POINTING.—On completion of work, filling all holes and joints in exposed masonry.

2-46.

CLEANING DOWN BUILDING.—At completion, leaving masonry clean, free from mortar, in good condition, and with tight mortar joints; rinsed with clean water before and after cleaning.

PART II. TYPICAL SPECIFICATIONS, MASONRY

MORTAR.—Mortar and its ingredients shall be as specified in section -----.

Fire brick shall be laid in plastic fire clay, unless otherwise specified.

Enameled brick shall be laid with class VIII mortar.

Flue linings and thimbles shall be laid with the same class of mortar as used in adjacent masonry.

All brickwork not otherwise specified shall be laid with class VI mortar.

COMMON BRICK.—All brickwork not otherwise shown or specified shall be laid with common brick.

Where used for face work in spaces 3-3, 3-4, 3-10, and in all stair halls, the brick shall be selected common brick. All other common brick where used for interior face work may be unselected common brick.

Sand-lime brick, complying with ASTM Specification C-73-30, Grade B, may be used as common brick, except for selected common brick.

All exposed brick on and about the exterior of the building and corridor, including same in porches, shall be similar and equal to the sample panel on file in the office of the Commissioner of Architecture at Blank St., Blank City, Blank State.

In all rooms or spaces, where "F. Br." (or similar term) is called for in the Schedules of Interior Finishes, all such interior face brick and also the brick linings of radiator recesses shall be a smooth-faced, iron spot brick similar and equal to John Doe Co.'s #116M or Richard Roe Brick Co.'s D Grade Cream or equal as approved, and shall not show any evidence of flashing or strips along edges of exposed faces. All other interior face brickwork shall be laid with common brick.

In addition to special-shaped brick required for arches, pattern work, and other special features, special shapes shall be furnished for

all special brick watertables or elsewhere where so indicated on the drawings or required.

All vertical external corners of the Doe or Roe, or equal, interior smooth iron spot face brick shall have bullnose corners, except in those radiator recesses which have hollow metal jamb trim.

Jamb brick shall be $3\frac{3}{8}$ inches wide to maintain uniform width of joints, and unless otherwise shown all external vertical corners and all window stools shall be formed with bullnose brick of about 1-inch radius.

Brick packed in cartons containing more than one brick shall have separators, not less than $3\frac{3}{4}$ by 8 inches in size, inserted between all brick.

General.—Common brick shall be standard size. They shall be reasonably uniform in shape and size and shall be well burned, as attested by a clear metallic ring when any two brick are struck together. They shall be homogeneous in structure throughout and entirely free from lamination planes, cracks, or voids.

Tests.—Common brick shall comply with ASTM Specification C62-30, Grade B.

Bats.—The number of bats used shall not exceed 10 percent of the number of whole bricks laid, and no bats shall be laid as headers nor in any face of a wall unless so required by the design.

Face Work.—Where used for face work, common brick shall be selected for quality, shape, and color.

HOLLOW BRICK.—Hollow brick shall be of similar quality and size as common brick, shall have scored faces, and the total area of perforations shall not exceed one-third of the cross-sectional area of the brick.

FACE BRICK.

General.—Face brick shall be standard size unless otherwise specified, shall be hard, durable, well-made brick of approved make, brand, and color or shade. In general, and unless otherwise

approved, the colors shall be the natural colors produced by the clay and by the process of manufacture. Interior face brick other than red brick shall be packed in paper cartons, and no chipped brick will be accepted. Brick used for face work, either common or face brick, shall be handled by tongs or by hand and in a manner to prevent damage to the brick.

Parapet Walls.—Back of parapet walls shall have face brick on all exposed surfaces unless otherwise specified.

Special Shapes.—Unless otherwise shown or specified, all special-shaped brick required for face work shall be of the same make, quality, color, and texture as the brick with which they are to be used, and shall have profiles as shown on the drawings. All such brick shall be molded or ground to the required shape, but ground surfaces shall not be exposed in the work. Molded brick at interior and exterior angles shall be with solid returns (not mitered).

Samples.—The contractor shall submit for approval not less than 20 full-size brick showing the full range of color, texture, and other physical properties. Each brick shall be given a number for identification, and duplicate samples bearing the corresponding numbers shall be kept on file by the manufacturer.

ENAMELED BRICK.—Enameled brick shall be well made, shall be of a standard, approved color, and shall include all standard special shapes as shown on the drawings or required by the work. All exposed surfaces of the brick shall be covered with a hard, durable enamel that will not peel or discolor and that will not be affected by sulfuric, nitric, or hydrochloric acids, even in concentrated form.

FIRE BRICK AND FIRE CLAY.

Fire Brick shall fulfill the requirements of ASTM Specification C27-20 for Low Heat Duty Fire Brick.

Fire Clay shall consist of refractory clay or mixtures of equal quality to that used in the manufacture of the fire brick.

FLUE LININGS AND THIMBLES.

Materials.—Flue linings and thimbles shall be manufactured from refractory clay or mixtures, shall be well burned, sound, and the inner surfaces shall be smooth. Where indicated on the drawing or specified for flues to carry fumes,

the inner surfaces shall be given a uniform salt glaze.

Sizes.—Flue linings shall be of the nominal dimensions indicated on the drawings and shall have thimble openings where required. Thimbles shall be of sizes shown or directed and shall extend from lining to face of masonry, including plastering if any.

Each piece shall contain no structural defects, shall be 24 inches long, except round flues 27 inches or more in diameter, which shall be 30 or 36 inches long, and shall conform to the following minimum weights and dimensions:

RECTANGULAR FLUES

Nominal dimensions	Outside dimensions	Thickness	Weight
<i>in.</i>	<i>in.</i>	<i>in.</i>	<i>lb/ft</i>
4×8	4½×8½	⅝	11
4×12	4½×13	⅝	18
8×8	8½×8½	⅝	18
8×12	8½×13	¾	27
8×18	8½×18	⅞	36
12×12	13×13	⅞	35
12×18	13×18	⅞	45
18×18	18×18	1⅞	69
20×20	20×20	1⅞	103
24×24	24×24	1½	129

ROUND FLUES

Nominal diameter	Inside diameter	Thickness	Weight
<i>in.</i>	<i>in.</i>	<i>in.</i>	<i>lb/ft</i>
6	6	⅝	11
8	8	⅝	17
10	10	⅞	27
12	12	1	37
15	15	1⅞	52
18	18	1¼	67
20	20	1⅝	90
22	22	1⅝	110
24	24	1⅝	120
27	27	2	186
30	30	2¼	218
33	33	2¼	315
36	36	2½	330

FIELD SAMPLES.—The contractor shall construct, for approval, field samples of face brick as directed. The samples shall be not less than 5 feet long by 3 feet high, and the brickwork shall be laid up in accordance with these specifications, or as directed. The approved sample shall be maintained intact until its removal has been directed.

DIMENSIONS.—A reasonable additional thickness, over the figured dimensions shown, will be permitted in brickwork, but no change shall be made in the outside dimensions of the building. The contractor shall be responsible for all dimensions and shall adjust other contingent work so as to conform to the brickwork.

WORKMANSHIP.

Laying Brick.—All brick shall be laid uniformly one scaffold high at a time, except where otherwise approved. Except where otherwise shown on the drawings, all brickwork shall be carried up plumb, faces of walls laid to a line and bed joints level. Interior face brick shall have each line of vertical face joints plumb and in true alinement. Each brick, except pressed brick or firebrick, shall be laid with a full bed of mortar, shoved into place, and the joints of each course shall be slushed full of mortar before the succeeding course is laid. The exposed ends of hollow brick shall be closed with mortar.

Parging.—The back of all exterior face brick, except headers, shall be parged to a thickness of approximately $\frac{1}{2}$ inch with mortar.

Starting New Work.—When starting work at a new level, the existing masonry shall be cleaned of all loose mortar or other materials and shall be thoroughly wetted.

Brick.—All brick shall be damp when laid. Brick having an absorption coefficient of more than 5 percent shall be thoroughly drenched with water if laid when the atmospheric temperature is more than 50° F.

Freezing Weather.—Brickwork shall not be laid in freezing weather, except as approved and when the work is adequately protected from the elements to safeguard the brickwork from damage.

Protection shall be provided at all times as necessary to prevent damage to the work by storms or freezing. The tops of all walls not completed or protected by other permanent work shall be constantly protected with suitable covering during periods of suspension of work. Projections and angles exposed to damage shall be boxed or otherwise protected to prevent damage.

Height of Courses.—Except where otherwise shown on the drawings or where required to member with other work, brickwork other than interior face brick shall be laid nine courses to a height of 24 $\frac{1}{4}$ inches. Split courses will not be permitted in face work. Where the coursing of existing brickwork permits, the coursing of the new work shall conform to the joints of the existing work. Interior face brick other than common brick shall be laid with $\frac{1}{4}$ -inch joints unless otherwise shown or specified.

Scaffolding.—All face brick, or common brick used for face work, shall be laid from scaffolding erected on the side of the wall on which the face brick occurs.

BOND.—Except where otherwise shown, exterior face-work bond shall consist of stretchers and every sixth course of full headers.

Except where otherwise shown or required, interior face brick shall be laid in running bond.

Except where otherwise shown or specified, brickwork shall be laid in common bond with every sixth course of full headers. The bonding shall extend through the wall from face to face. Where both faces of walls 8 inches thick are exposed, all brick in every sixth course shall be bonded with metal ties. Where Flemish bond is required the headers in every third course shall be full length. Running bond or other brickwork which is impracticable to bond with brick headers, shall be bonded to backing with wall ties, using one tie for not more than one square foot of brick facing. Interior face brick other than common brick shall be bonded with metal ties unless otherwise shown or specified.

JOINTS.—Joints in exposed faces of unselected common brickwork, if laid with clay brick, may be flush cut or struck. Joints in exposed faces of brickwork, if laid with sand-lime brick, shall be struck with a rubber boot heel so as to bond the brick and mortar. Joints of all other exposed brickwork shall be finished as specified.

Joints in exposed faces of brickwork shall be struck with an egg-shaped jointer unless otherwise directed. Brickwork which is to be plastered, or covered with other materials, shall have flush cut-off joints. Joints above projecting courses shall be weathered as directed. Interior face brick shall be concave jointed as approved.

ARCHES.

General.—Brick arches shall be laid as shown on the drawings. All arches shall be turned over suitable centers, which shall not be struck until the mortar has set hard enough to support the superimposed loads.

Skewbacks.—Arches shall spring from the extreme ends of centers and shall have skewbacks cut to provide full radial bearings at ends.

Rowlock Arches shall be turned over all openings not provided with steel lintels. Openings up to 4 feet wide shall have not less than three rowlocks, with one rowlock added for each 2 feet, or fraction thereof, increase in span. They shall be the full thickness of the wall, or of the backing where facework is shown.

Face Arches shall be constructed with ground or molded arch brick with the center line of joints on radial lines. The edges of a joint shall be parallel and all joints shall be of uniform width. Flat arches shall be constructed with a camber of $\frac{1}{16}$ inch per foot of width. Face arches shall be bonded to backing with a metal tie in each radial joint.

PATTERN WORK.—Pattern work shall be laid up as shown on the drawings. The work shall include all ornamental design, quoins, rowlock or soldier courses and shall conform to detail drawings. Intricate pattern work may be fabricated on the flat, backed with metal lath and mortar, and set in units.

FIREPLACES.

Materials.—The facing of fireplace shall be with exterior face brick unless otherwise specified, and all unexposed brickwork shall be laid with common brick. The lining of fire chamber shall be with fire brick, laid in fire clay, unless otherwise specified or noted on the drawings.

Hearth shall be constructed of the materials indicated on the drawings, conforming to the specifications of said materials and workmanship as specified for the items of work involved.

Arch.—Where arches are shown, the brick shall be constructed as specified.

Other Materials and workmanship required in the construction of fireplaces are specified in connection with the trade involved.

Workmanship.—The laying of common brickwork, setting of metal throat, and construction of flue shall be done in connection with adjacent brick walls.

Bond.—Common brick backing shall be provided with wall ties on each brick of every sixth or seventh course to provide a bond for face brick.

Fire Chamber lining shall be approximately 4 inches thick and shall be laid as specified for other similar brickwork.

Face Brick shall be laid in pattern as shown

in detail drawings, with joints pointed as shown or specified.

Smoke Chamber.—The space around the metal smoke chamber shall be solidly filled with brickwork. The top of smoke chamber shall be connected to flue with flue lining of the size shown for the flue; and, unless otherwise shown, the offset, where required, shall be constructed on an angle of 45 degrees.

FLUES.

Built in with Adjacent Work.—Brick flues and flue lining shall be built in with the adjacent work.

Thimbles.—The contractor shall provide and set terra cotta thimbles of sizes and at locations shown on the drawings. Thimbles shall finish flush with plaster or other finished surfaces.

Workmanship.—All flues shall be laid up straight, unless otherwise shown or required, shall be of uniform size throughout and smooth inside. Particular care shall be used to insure that flue linings and thimbles are completely and solidly backed with masonry.

VENT SHAFTS.—All brick shafts shown on the drawings shall be constructed with all appurtenances as shown.

WATERPROOFING PROTECTION.—All waterproofing on walls shall be protected by brickwork or solid cinder concrete block not less than $3\frac{3}{4}$ inches thick. The masonry units shall be laid up with class VI mortar, and the top shall be capped with a mortar wash.

Solid cinder concrete blocks shall be made of portland cement and clean cinder aggregates in such proportion as to develop, at the age of 28 days, an ultimate crushing strength of not less than 750 pounds per square inch when tested with the blocks on edge. Cinders shall not exceed $\frac{1}{8}$ inch in diameter.

POCKETS, CHASES, ETC.

General.—Pockets, chases, recesses, and other breaks in brickwork shall be constructed where and as shown on the drawings or in accordance with instructions given prior to the laying of brickwork.

Keys for Partitions.—Where hollow tile partitions abut brick walls, pockets shall be formed so that every alternate tile will bond 4 inches into the brickwork.

Temporary Openings To Be Closed.—Pockets,

openings, etc., in brickwork, formed for the concealment of other work, shall be closed with brick masonry after such other work has been installed and when directed.

BUILT-IN WORK.

General.—Work required to be built in with the brickwork, including anchors, wall plugs, and other accessories, shall be built in as the brickwork progresses. Unless otherwise required by the design, all spaces about built-in work shall be completely and solidly filled with masonry.

Reglets for flashings, where shown or directed, shall be raked out $1\frac{1}{2}$ inches deep.

Bucks, frames, and other built-in work shall be maintained in their proper position, and no braces or stays shall be removed from same until they are securely supported and fastened by the masonry.

SETTING PLATES, ETC.

Bearing Plates, lintels, and similar steel members shall be set and solidly bedded in mortar in their designed positions.

Column Bases shall be solidly grouted after the columns have been erected, plumbed, and permanently stayed in position.

Wood Plates resting on masonry shall be bedded in mortar and set in their designed positions.

CLEANING.

General.—After the completion of laying and of other adjacent work liable to soil the brickwork, all face work shall be thoroughly cleaned.

Method.—The cleaning shall, in general, be with water and bristle brushes. Any acids used shall be a weak solution that will not damage any of the materials with which it comes in contact and shall be completely removed with clear water. Wire brushes shall not be used for cleaning brickwork. The cleaning operations shall, in all cases, start at the top and proceed downward.

POINTING WINDOW AND DOOR FRAMES.—All window and door frames set in masonry walls shall be pointed on the inside with class III mortar.

ANCHORS AND WALL TIES.

Materials.—Type A anchors shall be formed of $\frac{3}{8}$ -inch by 2-inch flat steel bars 30 inches long, exclusive of bent ends, and with each end bent up 2 inches.

Wall Ties shall be formed of not lighter than No. 20 gage galvanized iron, shall be crimped or provided with equal approved anchorage, and shall be not less than $\frac{3}{4}$ -inch wide by 6 inches long.

Type F ties shall be formed of not lighter than No. 12 gage galvanized or cadmium-plated sheet steel not less than 1 inch wide, shall have ends bent in hook form, and shall be of length required by the facing material; or if wire inserts are used, the ties shall be formed of not lighter than No. 11 gage galvanized or cadmium-plated wire loops.

Where Required.—Where brickwork is carried up more than 4 feet above adjacent brickwork required to be bonded to same, type A anchors shall be built in on not exceeding 2-foot centers, with one-half the length of the anchor projecting for future bonding.

Wall ties shall be provided for bonding face brick to brick backing, except where brick headers are used. One tie shall be placed on each brick in every sixth course.

Wall ties shall be provided for bonding furring blocks or tile veneer to brick walls where the height of wall exceeds 11 feet. The ties shall be set and built in at the required height to coincide with the horizontal joints of the tile work and shall be set on not exceeding 2-foot centers in both directions. No wall ties are required for walls 11 feet or less in height.

Type F ties shall be provided for bonding brick or tile veneer to type D anchors in concrete walls. The furnishing and setting of type D anchors are specified in section _____. Type F ties shall be placed in each type D anchor not more than 12 inches apart vertically.

STANDARD HOLLOW BLOCKS.

General.—Standard hollow tile shall be manufactured from surface clay, shale, fire clay, or admixtures thereof; shall be well burned, reasonably free from laminations and from such cracks, blisters, surface roughness, and other defects as would impair their strength or prevent the proper setting of the tile.

Concrete Blocks may be used for interior non-load-bearing partitions where shown as hollow tile. The blocks shall be made of portland cement and clean cinder aggregates in such proportion as to develop, at the age of 28 days, an ultimate crushing strength per square inch of gross area of not less than 300 pounds when

tested with the cells placed either vertically or horizontally.

Surfaces of tile or concrete blocks to be covered with stucco or plaster shall be a surface suitable to provide a good bond for the mortar. All other exposed surfaces shall be smooth.

Properties.—Except as otherwise specified below, load-bearing tile shall fulfill the requirements of ASTM Specification C34-30, for Medium Class, and non-load-bearing tile shall fulfill the requirements of ASTM Specification C56-30, for Medium Class.

Load-Bearing Tile shall have over-all thickness of exterior shells of not less than $\frac{7}{8}$ inch and webs not less than $\frac{5}{8}$ inch. Scoring shall be not more than $\frac{3}{16}$ inch in depth, nor cover more than 50 percent of the exterior area of the units.

Partition Tile shall have over-all thickness of exterior shells of not less than $\frac{5}{8}$ inch and interior webs not less than $\frac{1}{2}$ inch. Scoring shall be not more than $\frac{1}{8}$ inch in depth, nor cover more than 50 percent of the exterior area of the units.

Laying Out.—Partitions shall be laid out with one course of blocks to define the spaces, location of doors and other openings, and to serve as a guide for other trades in the installation of conduits, pipes, etc. Sufficient opportunity shall be given to the various trades, or contractors, to install built-in work before proceeding with the partitions. This contractor shall build in all such work and shall leave openings where required for testing, etc., after which they shall be built in.

Mortar.—Hollow tile shall be laid in class VI mortar.

Laying Tile.—Hollow tile shall be laid in horizontal courses with vertical joints broken not less than 3 inches. Each block as laid shall be solidly bedded in mortar, with vertical joints well filled, and shall be shoved to a bearing with as close a joint as is consistent with good workmanship, pointing up and filling all crevices. Face of walls shall be carried up plumb and true. Tile adjacent to openings or exterior angles shall be laid with cells vertical, or the ends of cells shall be closed in an approved manner. Hollow tile shall be bonded together at all corners and angles and to other abutting work by an alternate lapping of tile.

Chases, pockets, and other breaks in tile construction shall be formed where shown on the

drawings or for which instructions are given prior to the laying of hollow tile in such locations. Chases or other breaks in hollow tile, left for the installation of other work, shall be closed with hollow tile or other masonry, if so directed, after the work has been installed and approved.

Metal Wall Plugs and other such accessories, required for securing other work, shall be set and built in with the hollow tile.

Built-in Work.—Bucks, frames, and other built-in work shall be maintained in their proper position, and bracing shall not be removed until they have been securely fastened to the masonry. Hollow tile shall be bedded against all built-in work with full mortar joints, and all spaces between the tile and the built-in work shall be completely and solidly filled with mortar.

Lintels of reinforced hollow partition blocks shall be provided over all openings in hollow tile walls, partitions, or furring, except where steel lintels are shown or specified. They shall be formed by filling the cells of the tile with mortar and rodding same thoroughly to eliminate voids. The reinforcement shall then be inserted and the mortar allowed to set hard before the lintel is set in place. The lintels shall be of sufficient length to lap on jamb tile at least 4 inches over the maximum opening width. Tile for lintels shall be set with cells horizontal.

Partitions.—All partitions and division walls, other than bearing walls, where indicated as of hollow tile, shall be constructed with partition tile. Straight-run partitions exceeding 20 feet in length between intersecting partitions or walls, or exceeding 12 feet in height, shall be stiffened by placing in each horizontal joint a strip of galvanized expanded metal lath of a width equal to the thickness of the tile and lapped 2 inches at end joints of adjoining strips. Partitions shall be of the thickness indicated on the drawings. Where no dimensions are shown, they shall be 4 inches thick. The thickness shown or specified shall be the thickness of the hollow-tile construction exclusive of plastering or other applied materials. Partitions shall be carried up to the underside of the structural floor or roof slab, except where suspended ceilings occur, in which case they may terminate at the ceiling level.

Walls.—Exterior walls and all interior bearing walls where shown or specified to be of hol-

low tile shall be constructed with load-bearing tile of the thickness and dimensions indicated on the drawings, forming all corners, returns, and offsets as shown and using the required shape and size of tile to work up to corners and openings and to maintain proper bond throughout the length of wall.

Wall Backing.—Hollow-tile backing shall be laid up with load-bearing tile of the dimensions and shapes required for bonding with the facing materials and to form walls of the dimensions shown on the drawings. The backing shall be carried up simultaneously with the facing material and shall be bonded to same, as shown on the drawings. Wall backing tile may be laid with cells either horizontally or vertically.

Setting Plates, Etc.—All bearing plates, structural steel work, wood nailing plates, and other similar work resting on tile walls shall be set in their designed position and bedded in mortar.

Furring.—Where plastering is required on the interior surface of exterior walls, 2-inch partition tile shall be built against the outside walls of the building. The tile shall be laid with cells vertical except for lintels and window sills. Unless otherwise shown or required, the tile shall be returned on jambs and other reveals or projections. The tile shall not be bedded with mortar against the backing. Furring shall be carried up to the underside of the structural floor or roof slab, except where suspended ceilings occur, in which case they may terminate at the ceiling level.

Column Covering.—Structural columns, where so indicated on the drawings or specified, shall be encased in hollow tile of the size and shape required to give the finished outlines shown on the drawings. The covering shall be carried up tight against the structural ceiling or beams above, finishing with a full mortar joint. Tiles shall be set with cells vertical and with all the vertical joints broken.

SALT-GLAZED FACE TILE.

Description.—Salt-glazed face tile shall be manufactured from fire clay, shall be vitrified, and shall conform to the strength requirements of ASTM Specification C34-27 for hard tile.

Size.—The face shall, in general, be approximately 5 by 8 inches, and the thickness approximately as indicated on the drawings or as specified.

Specials.—External corners shall be bullnose and interior angles shall be square. Base shall have standard cove at bottom with radius of not more than 1 inch and shall finish flush with wall at top. Furnish all necessary miters, angle, jamb, sill, lintel, and starting blocks.

Physical Properties.—The exposed surfaces shall be free from warps, twists, blisters, or other defects which would affect the appearance or prevent the proper setting of the tile. Exposed surfaces shall have smooth salt-glazed finish.

Absorption.—The absorption of the tile block after submersion in pure water for a period of 48 hours shall not exceed 5 percent of the dry weight of the tile block.

Color.—Base tile shall be an approved shade of brown. All other salt-glazed face tile shall be full range from light buff to light brown.

Quality.—All salt-glazed face tile shall be first quality. Grades known as Commercial, Kiln Run, or Seconds shall not be used. The manufacturer shall furnish a certificate or statement stating that all tile furnished are selected, first quality stock.

Shipping.—Salt-glazed face tile shall be carefully packed for shipment and handled in such manner as to avoid damage. Any tile damaged or chipped on exposed surfaces shall be rejected. Special units shall be packed in sawdust, shavings, or protected in other approved manner.

Mortar.—Salt-glazed face tile shall be laid in class VI mortar, colored to match the tile as approved.

Joints shall be $\frac{1}{4}$ inch in thickness and shall be finished with a smooth concave joint.

Laying Tile.—The tile shall be laid true to line and with courses level. The end joints shall be over the center of the underlying tile. Each unit as laid shall be solidly bedded in mortar, with vertical joints well filled, and shall be shoved to a bearing, pointing up and filling all crevices.

Partitions and Furring.—Where glazed finish is required on both sides of 6-inch partitions, the partitions shall be built with separate units for each face, using units $3\frac{3}{4}$ inches and $1\frac{1}{8}$ inches thick in each course, alternating in successive courses so as to break the center or core joint. The finished thickness of these partitions shall be 6 inches, and where used as a wainscot, the

portion of partition above the wainscot shall be built with 4-inch block construction, leaving 1 inch on each side for plastering.

For partitions with 4½-inch finished thickness where glazed finish is required on one side and plastering on the other side, the partitions shall be built with salt-glazed tile units 3¾ inches thick, glazed on one face and scored for plastering on the opposite face. Where used as a wainscot, the portion of the partition above the wainscot shall be built of 3-inch standard hollow-tile construction set flush with the unglazed face.

Salt-glazed face tile on exterior walls, columns, or on partitions greater than 6 inches in finished thickness shall be laid up with units approximately 1½ inches thick, bonded to backing with wall ties or other approved anchorage.

Cutting and fitting shall be neatly done around pipes, outlet boxes, etc. The work shall be done in such manner that the plates, collars, etc., will cover all unfinished edges. Laying out shall be as specified. Closures shall be cut at the job with a carborundum saw, and the minimum length of any closure shall be one-fourth the length of a standard unit.

Cleaning.—After completion of the setting, all salt-glazed tile shall be thoroughly cleaned, removing all dirt, mortar stains, etc.

ENAMELED FACE TILE.—Enameled face tile shall be as specified, except that the size of a standard unit shall be approximately 5 inches high by 8 inches long.

PORCELAIN-GLAZED TERRA COTTA.

Materials.—Porcelain-glazed terra cotta shall consist of machine-made hollow terra cotta blocks with a porcelain glaze finish on all exposed surfaces. The blocks shall be manufactured from suitable clay with ample grog or grit component so that the blocks will burn straight and true. Exposed surfaces shall be in a true plane, out of wind and free from ridges, indentations, or blisters. Blocks with chipped edges or surfaces shall be rejected.

Size.—The blocks shall be the sizes indicated on the drawings or as approved. Unless otherwise shown or approved, the blocks shall be 8 inches in height, 16 inches long, and of thickness as required by details to lay up or face the walls and bond with other materials.

Specials.—External corners shall be bullnose and internal angles shall be square, except where otherwise shown. Base shall have standard cove at bottom with radius of not more than 1 inch and shall finish flush with wall at top. Furnish all necessary miters, angle, jamb, sill, and lintel blocks.

Finish.—Unless otherwise specified, the finish shall be of color or combination of colors as directed on a cream or ivory background. Surfaces exposed in spaces not required to have porcelain-glazed terra cotta shall be smooth but need not be glazed. Surfaces required to be plastered shall be scored to provide a bond for the plaster.

Mortar.—Porcelain-glazed terra cotta shall be laid in class VII mortar and shall be colored where required to match the tile.

Joints shall be ⅝ inch in thickness and shall be finished with a smooth concave joint.

Ground Edges.—All edges and ends shall be ground so as to accurately size the blocks and remove all glaze from such surfaces.

Packing.—Blocks shall be packed in suitable cartons that will protect the terra cotta from damage.

Cutting.—Field cutting shall be done with a carborundum saw where the arrises are exposed in the finished work. Closures shall be not less than one-fourth the length of a standard unit.

Laying.—The tile shall be laid true to line and with courses level. The end joints shall be over the center of the underlying tile. Each unit as laid shall be solidly bedded in mortar, with vertical joints well filled, and shall be shoved to a bearing, pointing up and filling all crevices.

Partitions and Furring shall be as specified in the preceding article for salt-glazed tile, except that the thickness of the tile blocks may vary, as required, to conform to standard units.

Cleaning.—After completion of the setting, all porcelain-glazed terra cotta shall be thoroughly cleaned, removing all dirt, mortar stains, etc.

COLUMNS.—All exposed surfaces of columns shall be given the same finish as walls or wainscots of rooms in which columns occur.

CUTTING FOR OTHER TRADES.—Do all cutting and fitting required for the installation of the

work of other trades. Openings in exposed faces of tile shall be neatly cut for switch boxes and other similar work so that cover plates, collars, etc., will cover the cut edges. Where pipes or conduits occur in tile walls, split tile blocks shall be used and the webs of tile shall be notched, as required, to fit the pipes.

ANCHORS AND WALL TIES.—The furnishing and setting of wall ties for bonding block construction to brick walls are specified in section ----. All such ties shall be built in with the block work.

Type D anchors are specified in section ---- for bonding block construction to concrete walls. Type F ties shall be furnished and installed in connection with these anchors for bonding wall furring to concrete walls.

Wall ties shall be furnished and installed for bonding furring or hollow-face tile to block

construction. The ties shall be set at the proper height to coincide with the horizontal joints of the facing materials and shall be set on not exceeding 2-foot centers in both directions.

Wall ties shall be formed of not lighter than No. 20 gage galvanized iron, shall be crimped, and shall be not less than $\frac{3}{4}$ inch wide by 6 inches long.

Type F ties shall be formed of not lighter than No. 12 gage galvanized or cadmium-plated sheet steel not less than 1 inch wide, shall have end bent in hook form, and shall be of length required by the facing material; or the ties shall be formed of not lighter than No. 11 gage galvanized or cadmium-plated wire loops.

PROTECTION.—Block construction shall not be laid in freezing weather, except as approved and when the work is adequately protected.

PART III. STREAMLINED SPECIFICATIONS, MASONRY

In rewriting Typical Specifications for Masonry, part II, according to the principles set forth in the Model Basic Specifications for Masonry, part I, the specification writer's notes will take the following form:

SPECIFICATION WRITER'S NOTES

SCOPE.—2-1.

COMMON BRICK.—2-2. .1 .2 or .3; Class
.4 .5

SAND-LIME BRICK.—2-3. .1 .6 except exposed brick in spaces 3-3, 3-4, 3-10, and stair halls.

EXPOSED BRICK.—Exterior, also including corridor, porches, and backs of parapet walls—similar and equal to sample panel on file in office of Commissioner of Architecture, _____ Street, _____ City, _____ State. Interior where noted "F. Br." and also in radiator recesses—John Doe Co.'s #116M, face, iron spot; spaces 3-3, 3-4, 3-10, and stair halls—common; 2-5.2

MOLDED OR GROUND BRICK.—2-6. bullnose external vertical corners and window stools in connection with "F. Br." brick; watertables; .3; .4; special shapes.

FIRE BRICK.—2-8. .1 .2

FLUE LININGS AND THIMBLES.—2-9.

HOLLOW CLAY TILE.—2-13.1 backing of .2 and .3 .8 .9 .10

CONCRETE BLOCKS.—2-14. .1 in lieu of common brick in contact with earth, at contractor's option; .3 .4 .5 .9

STRUCTURAL FACING UNITS.—2-16.1 .2 .8 as directed on a cream or ivory background, 5"×8". Other units—unglazed. .29 bullnose external corners, angles, miters, .34 .30 and lintels: 1" radius cove flush top base. .53 $\frac{3}{16}$ " thick.

ANCHORS AND TIES.—2-26. Wall ties—not less than 20-gage galvanized crimped iron,

6" long and at least $\frac{3}{4}$ " wide. Type "A" anchors— $\frac{3}{8}$ "×2" flat steel bars 34" long with ends bent up 2". Type "F" ties—12-gage galvanized or cadmium-plated sheet steel 1" wide with ends hooked or of 11-gage galvanized or cadmium-plated wire loops for use in slots or inserts.

MORTARS.—See section -----.

SAMPLES.—2-28. John Doe, _____ Street, _____ City, _____ State: Brick—25 each of all shapes, sizes, and kinds. Brick panel—where directed on site, 5' long, 3' high, showing required shape, size, and type of brick, full range of color, bond and mortar joint of brick as specified.

BRICKWORK.—2-29. .1 .2 .3 .4 .5 .6; .11; .13
Exposed Exterior brickwork laid in .16
Exposed Interior brickwork alid in .18
.25 .26 .28 .32
.33
.37 one wall-tie for each square foot of wall surface.

HOLLOW CLAY TILE AND MASONRY UNIT WORK.—2-30. .1 .2 .4
.9
.10. .11 .12 and .13 .14 .15 .16
.17 .18 .20 .22 .23
.24
.25 .26 or .27 .28
.31

STRUCTURAL FACING UNITS.—2-31.
.4

FLUE LININGS.—2-36.

BUILT-IN ITEMS.—2-42. .1 .2 .4 .5 .6
.7 .8 .9 .10 .11 and .12

CUTTING AND PATCHING.—2-43.

PROTECTION.—2-44.

POINTING.—2-45.

CLEANING DOWN BUILDING.—2-46.

These notes, when transcribed, become the rewritten specifications that follow.

REWRITTEN SPECIFICATIONS, MASONRY

SCOPE.—Mention herein or indication on the drawings of articles, materials, operations, or methods requires that the contractor provide each item mentioned or indicated (of quality or subject to qualifications noted); perform (according to conditions stated) each operation prescribed; and provide therefor all necessary labor, equipment, and incidentals.

COMMON BRICK.—Fed. Spec. SS-B-656; $2\frac{1}{4}'' \times 3\frac{3}{4}'' \times 8''$; Class H, for brick in contact with earth or exposed to the weather; Class M, elsewhere.

SAND-LIME BRICK.—Fed. Spec. SS-B-681; $2\frac{1}{4}'' \times 3\frac{3}{4}'' \times 8''$; Class H or M for use, at contractor's option, in lieu of Class M common brick except exposed brick in space 3-3, 3-4, 3-10, and stair halls.

EXPOSED BRICK.—Exterior, also including corridor, porches, and backs of parapet walls—similar and equal to sample panel on file in office of Commissioner of Architecture,-----

-----Street,-----City,

-----State. Interior where noted "F. Br" and also in radiator recesses—John Doe Co.'s #116M, or Richard Roe Brick Co.'s D Grade Cream or other approved smooth face, iron spot; spaces 3-3, 3-4, 3-10, and stair halls—common; selected for color and shape; show surfaces similar in color and texture, free from distortion, warpage, cracks, and other imperfections, and with good corners and edges.

MOLDED OR GROUND BRICK.—Color and texture to match adjacent brick; accurate size to exact line for bullnose external vertical corners and window stools in connection with "F. Br" brick; watertables; arches; pattern work; special shapes.

FIRE BRICK.—Fed. Spec. HH-B-671b; Back-Up Duty Grade for fireplace linings.

FLUE LININGS AND THIMBLES.—Hard-burned fire clay; free from fractures, large cracks, blisters, and warping; standard sizes; sound. Thimbles for each flue where directed.

HOLLOW CLAY TILE.—Load bearing.—Fed. Spec. SS-T-341; Grade M; for backing of exterior walls and for load-bearing partitions. Non-load-bearing—Fed. Spec. SS-T-351; Grade

S; for non-load-bearing partitions. Closures, fitters, and special shapes as required.

CONCRETE BLOCKS.—Fed. Spec. SS-C-621; weight a; type I in lieu of common brick in contact with earth, at contractor's option; type II in lieu of non-load-bearing clay tile, at contractor's option; standard sizes and shapes with closures, fitters, and special shapes as required; adequately cured by air, water, or steam before shipment.

STRUCTURAL FACING UNITS.—First Quality in accordance with Standard Grading Rules of Brick and Tile Institute; ceramic glazed units of color as directed on a cream or ivory background, $5'' \times 8''$. Other units—unglazed. Special shapes as required for bullnose external corners, angles, miters, jambs, sills, and lintels; $1''$ radius cove, flush top base. Mortar joints $\frac{3}{16}''$ thick.

ANCHORS AND TIES.—To secure masonry to backing or adjoining construction. Wall ties—not less than 20-gage galvanized crimped iron, $6''$ long and at least $\frac{3}{4}''$ wide. Type "A" anchors— $\frac{3}{8}'' \times 2''$ flat steel bars $34''$ long with ends bent up $2''$. Type "F" ties—12-gage galvanized or cadmium-plated sheet steel $1''$ wide with ends hooked, or of 11-gage galvanized or cadmium-plated wire loops for use in slots or inserts.

MORTARS.—See section -----

SAMPLES.—As follows to John Doe, -----
-----Street,-----City,

-----State: Brick—25 each of all shapes, sizes, and kinds. Brick panel—where directed on site, $5'$ long, $3'$ high, showing required shape, size, and type of brick, full range of color, bond and mortar joint of brick as specified.

BRICKWORK.—Plumb; true to lines; courses level; reveals and corners, plumb and true; each course laid as through course with no vertical joint in any one course directly over vertical joint in course next below; each brick shoved into place, not laid, in full unfurrowed bed of mortar; all horizontal and vertical joints completely filled with mortar as, or when, laid; back joint against concrete, metal, hollow clay tile, concrete masonry units, slushed, grouted, or shoved full as-course is laid; jambs and heads

of frames—filled solid with mortar; chases and reglets free from mortar or debris at completion.

Exposed Exterior brickwork laid in English bond, i. e. alternating courses of whole stretchers, overlapping each other by $\frac{1}{2}$ brick, and headers with whole headers every third course.

Exposed Interior brickwork laid in running bond, i. e. whole stretchers overlapping by $\frac{1}{2}$ brick and tied together and to backing with wire, corrugated or crimped ties on alternating brick in every third course.

Joints in Face Work.—Approximately $\frac{1}{2}$ " wide; natural color mortar; concave; formed with suitable tools after mortar has taken initial set.

Other Joints.—Flush in exposed work.

Veneer.—Stretcher facing anchored to backing with one wall tie for each square foot of wall surface.

HOLLOW CLAY TILE AND MASONRY UNIT WORK.—Plumb to lines; in full bed of mortar; vertical joints breaking approximately at middle of tile in course next below; courses bonded at corners and intersections; cells horizontal except may be vertical at pipes or conduits; no cells left open in wall surfaces; brick fill-ins as required for securing plumbing or other fixtures, filling out corners, bearing for joists and beams.

Wetting.—Hollow clay tile with greater than 12 percent absorption, wetted 24 hours before laying except in freezing weather. No freshly wetted tile or tile with film of water or frost laid.

Partitions.—4" thick unless otherwise shown; bonded or anchored to any other adjacent masonry with wire mesh, corrugated metal, bar or rod ties in every other course extending 4" into concrete, 8" into brickwork, and 12" into hollow masonry, and spaced 16" apart vertically for 4" thick partitions, 24" apart vertically for partitions thicker than 4". Partitions to extend from floor to ceiling along corridors, around pipe shafts; elsewhere to suspended ceilings where same occur, unless otherwise shown; joints at ceilings wedged and slushed full of mortar from both sides.

Interior Channel Spaces of Columns.—Filled in solid, using special shapes as required for this purpose.

Reinforced Lintels.—Of hollow clay tile or

concrete masonry units; over all openings except where steel lintels occur; extended at least 8" on each side of opening; cells horizontal, filled with 1:2:4 mix concrete and reinforced full lintel length with one $\frac{1}{2}$ " rod through each top and bottom cell of multiple-cell width tile and two rods in top cell and two in bottom cell of single-cell width tile.

Furring Units tied to masonry backing with one wire mesh, corrugated metal, or looped-wire tie for each 2 sq. ft., extending at least 4" into masonry backing and to within $\frac{1}{2}$ " of outer face of furring unit.

STRUCTURAL FACING TILE.—Plumb to lines; in full bed of mortar; vertical joints breaking approximately at middle of unit in course next below; courses bonded at corners and intersections; anchored to concrete and other masonry; joints uniform width, tooled slightly concave; shipped or spalled glaze not accepted.

Cutting Units.—With power saw to straight clean-cut joints; as required for built-in work.

FLUE LININGS.—Full height of chimney starting 2'0" below lowest smoke entrance, one section ahead of masonry; full mortar beds; space between linings and brickwork slushed full of mortar as work progresses; joints close and struck flush on inside; thimbles neatly fitted with full mortar joints struck flush; flues free from surplus materials and debris.

BUILT-IN ITEMS.—As work progresses; following items provided as specified under other sections: sheet metal, loose structural steel, anchors and ties, sleeves, thimbles, frames, inserts, wall plugs, blocking, grounds, and furring.

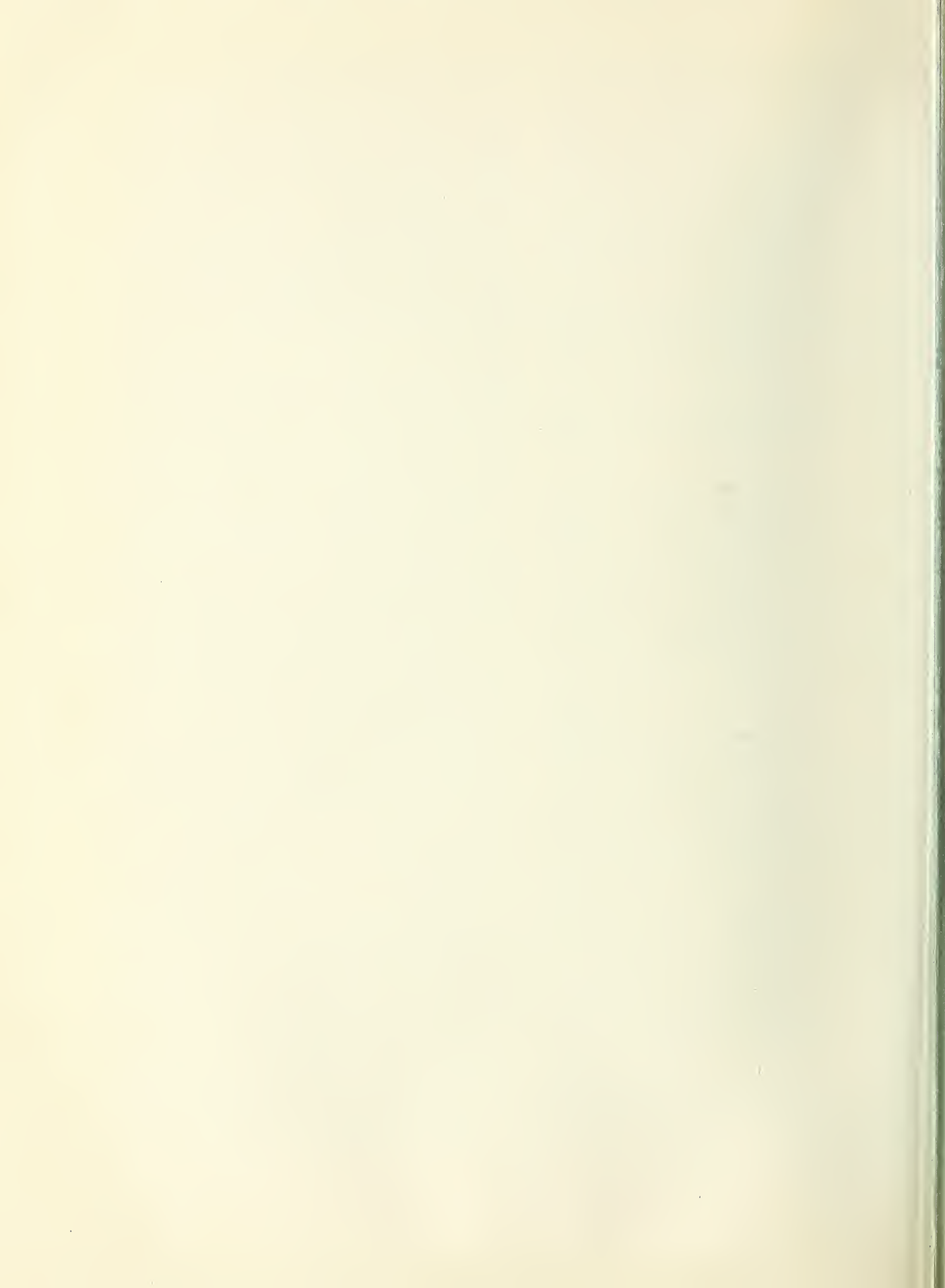
CUTTING AND PATCHING.—As required to accommodate work of others.

PROTECTION.—Surfaces not being worked on; from frost; tops of walls at end of each day or when rain or snow is imminent, by covering with strong waterproof membrane well secured in place.

POINTING.—On completion of work, filling all holes and joints in exposed masonry.

CLEANING DOWN BUILDING.—At completion, leaving masonry clean, free from mortar, in good condition, and with tight mortar joints; rinsed with clean water before and after cleaning.

WASHINGTON, May 26, 1942.



BUILDING MATERIALS AND STRUCTURES REPORTS

[Continued from cover page II]

BMS32	Structural Properties of Two Brick-Concrete-Block Wall Constructions and a Concrete-Block Wall Construction Sponsored by the National Concrete Masonry Association	10¢
BMS33	Plastic Calking Materials	10¢
BMS34	Performance Test of Floor Coverings for Use in Low-Cost Housing: Part 1	10¢
BMS35	Stability of Sheathing Papers as Determined by Accelerated Aging	10¢
BMS36	Structural Properties of Wood-Frame Wall, Partition, Floor, and Roof Constructions With "Red Stripe" Lath Sponsored by The Weston Paper and Manufacturing Co.	10¢
BMS37	Structural Properties of "Palisade Homes" Constructions for Walls, Partitions, and Floors, Sponsored by Palisade Homes	10¢
BMS38	Structural Properties of Two "Dunstone" Wall Constructions Sponsored by the W. E. Dunn Manufacturing Co.	10¢
BMS39	Structural Properties of a Wall Construction of "Pfeifer Units" Sponsored by the Wisconsin Units Co.	10¢
BMS40	Structural Properties of a Wall Construction of "Knap Concrete Wall Units" Sponsored by Knap America, Inc.	10¢
BMS41	Effect of Heating and Cooling on the Permeability of Masonry Walls	10¢
BMS42	Structural Properties of Wood-Frame Wall and Partition Constructions With "Celotex" Insulating Boards Sponsored by The Celotex Corporation	15¢
BMS43	Performance Test of Floor Coverings for Use in Low-Cost Housing: Part 2	10¢
BMS44	Surface Treatment of Steel Prior to Painting	10¢
BMS45	Air Infiltration Through Windows	10¢
BMS46	Structural Properties of "Scot-Bilt" Prefabricated Sheet-Steel Constructions for Walls, Floors, and Roofs Sponsored by The Globe-Wernicke Co.	10¢
BMS47	Structural Properties of Prefabricated Wood-Frame Constructions for Walls, Partitions, and Floors Sponsored by American Houses, Inc.	10¢
BMS48	Structural Properties of "Precision-Built" Frame Wall and Partition Constructions Sponsored by the Homasote Co.	10¢
BMS49	Metallic Roofing for Low-Cost House Construction	10¢
BMS50	Stability of Fiber Building Boards as Determined by Accelerated Aging	10¢
BMS51	Structural Properties of "Tilecrete Type A" Floor Construction Sponsored by the Tilecrete Co.	10¢
BMS52	Effect of Ceiling Insulation Upon Summer Comfort	10¢
BMS53	Structural Properties of a Wall Construction of "Munlock Dry Wall Brick" Sponsored by the Munlock Engineering Co.	10¢
BMS54	Effect of Soot on the Rating of an Oil-Fired Heating Boiler	10¢
BMS55	Effects of Wetting and Drying on the Permeability of Masonry Walls	10¢
BMS56	A Survey of Humidities in Residences	10¢
BMS57	Roofing in the United States—Results of a Questionnaire	10¢
BMS58	Strength of Soft-Soldered Joints in Copper Tubing	10¢
BMS59	Properties of Adhesives for Floor Coverings	10¢
BMS60	Strength, Absorption, and Resistance to Laboratory Freezing and Thawing of Building Bricks Produced in the United States	15¢
BMS61	Structural Properties of Two Nonreinforced Monolithic Concrete Wall Constructions	10¢
BMS62	Structural Properties of a Precast Joist Concrete Floor Construction Sponsored by the Portland Cement Association	10¢
BMS63	Moisture Condensation in Building Walls	10¢
BMS64	Solar Heating of Various Surfaces	10¢
BMS65	Methods of Estimating Loads in Plumbing Systems	10¢
BMS66	Plumbing Manual	20¢
BMS67	Structural Properties of "Mu-Steel" Prefabricated Sheet-Steel Constructions for Walls, Partitions, Floors, and Roofs Sponsored by Herman A. Mugler	15¢
BMS68	Performance Test of Floor Coverings for Use in Low-Cost Housing: Part 3	15¢
BMS69	Stability of Fiber Sheathing Boards as Determined by Accelerated Aging	10¢
BMS70	Asphalt-Prepared Roll Roofings and Shingles	15¢
BMS71	Fire Tests of Wood- and Metal-Framed Partitions	20¢
BMS72	Structural Properties of "Precision-Built, Jr." Prefabricated Wood-Frame Wall Construction Sponsored by the Homasote Co.	10¢
BMS73	Indentation Characteristics of Floor Coverings	10¢
BMS74	Structural and Heat-Transfer Properties of "U. S. S. Panelbilt" Prefabricated Sheet-Steel Constructions for Walls, Partitions, and Roofs Sponsored by the Tennessee Coal, Iron & Railroad Co.	15¢
BMS75	Survey of Roofing Materials in the North Central States	15¢
BMS76	Effect of Outdoor Exposure on the Water Permeability of Masonry Walls	15¢
BMS77	Properties and Performance of Fiber Tile Boards	10¢
BMS78	Structural, Heat-Transfer, and Water-Permeability Properties of Five Earth-Wall Constructions	20¢
BMS79	Water-Distributing Systems for Buildings	15¢
BMS80	Performance Tests of Floor Coverings for Use in Low-Cost Housing: Part 4	15¢
BMS81	Field Inspectors' Check List for Building Construction (cloth cover, 5 by 7½ inches)	20¢
BMS82	Water Permeability of Walls Built of Masonry Units	20¢
BMS83	Strength of Sleeve Joints in Copper Tubing Made with Various Lead-Base Solders	10¢
BMS84	Survey of Roofing Materials in the South Central States	15¢
BMS85	Dimensional Changes of Floor Coverings With Changes of Relative Humidity and Temperature	10¢
BMS86	Structural, Heat-Transfer, and Water-Permeability Properties of "Speedbrik" Wall Construction Sponsored by the General Shale Products Corporation	15¢
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